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LIII.—*Descriptions of some Gigantic Forms of Invertebrate Animals from the Coast of Scotland.* By HARRY D. S. GOODSIR, M.W.S.

[With a Plate.]

SERPENTARIA. Pl. XX. fig. 1, 2.

Gen. Char.—Anterior extremity of the body pointed, with the proboscidean orifice obscure and imperfectly developed; the male generative apertures on each side; cloaca on the abdominal surface immediately behind. Body depressed. The power of division very great.

Description.—The power which this animal possesses of so easily casting off the various segments of its body renders it difficult, in fact impossible, to state its exact length. The longest portion of three specimens which have at various times come into my possession was about one yard in length, and when fully extended about $\frac{7}{8}$ ths of an inch in breadth. The whole body was of a bright slate-blue colour, with the exception of the proboscis, which was yellow, and a narrow strip of the same colour down each edge, which gradually became narrower on approaching the posterior extremity. The anterior third of the body was much larger and broader than the remaining portion, from which it gradually tapered towards the distal extremity. The anterior extremity tapered very suddenly to a point (*rostrum*), which was generally curved upwards.

As the animal has no true proboscis, the proboscidean orifice is very small or imperfectly formed, which renders it difficult to be seen. On each side of the rostrum there is to be seen a longitudinal narrow slit, generally closed, and communicating with the male generative system.

Immediately behind these, and on the abdominal surface, is another larger orifice, which the animal has the power of opening and shutting at pleasure. When open it is of an ovoid shape. The edges are serrated. This leads into a large longitudinal

cavity which runs through the whole length of the body, but for a considerable extent anteriorly is continuous and very much dilated; in the remainder of its extent it is more confined and interrupted by the ovaries which lie on each side of it. All that portion of the body in which the common cavity is continuous and dilated consists of one annulus, but the succeeding or terminal is composed of a great many, each about the eighth of an inch in length. Each of these separated annuli contains all the elements of the perfect or original animal, viz. a male and female generative apparatus, the cavity common to the generative, digestive and respiratory functions, and a small dorsal vessel analogous to the intestinal canal of *Nemertes*. *Serpentaria* therefore is a composite animal, each perfect individual consisting of numerous and apparently still unformed or imperfectly formed individuals. That we are justified in looking upon this animal as composite will be acknowledged from what will be stated still further when referring to the physiological phenomena it presents to us.

When swimming this animal is very active, and advances with considerable rapidity by means of an undulatory serpentine motion. When handled it throws itself into various contortions, and instantly casts off numerous annuli from the posterior part of its body, each of which, immediately upon its separation from the original, begins to move in a similar manner. The consistence of the body when alive is soft and gelatinous, and is covered with a thick tenacious slime.

NEMERTES. Pl. XX. fig. 3.

Gen. Char.—Anterior extremity of the body rounded, somewhat quadrilobate, with the proboscidean orifice in the centre. Male generative apertures on each side. Cloaca or abdominal surface immediately behind. Body cylindrical. The power of division not great.

Description.—The whole body of a dark umber colour with the exception of a few narrow longitudinal white lines. The anterior portion of the body is corrugated transversely. It is almost half an inch in breadth, and tapers from this very gradually to the terminal extremity. The anterior extremity is slightly quadrilobate, and in the centre there is a small foramen through which a long, narrow, extensile, trumpet-shaped proboscis can be protruded at the will of the animal. On each side of this are two narrow longitudinal slits similar to those in *Serpentaria*. The edges however are more rounded, and consequently not so closely applied to one another. These, as already mentioned, are apertures to the male generative apparatus, which consists of two long, narrow cellular tubes, running down each side of the body.

The cloaca on the abdominal surface of the body is small and rounded, and opens into an oblong cavity similar to that of *Serpentaria*. The anterior extremities of the ovaries, or all that lies in the continuous portion of the common cavity, are very slightly attached; that again which belongs to the interrupted portion of the cavity is more firmly bound down.

In the most perfect specimen I could obtain the posterior extremity was bifurcated, but the opening in it was so large that it appeared to be only in process of filling up after the last separation, and therefore in all probability was not perfect.

The leading features in the structure of both of these animals will be seen from the above descriptions to be similar. Owing to the assistance derived from the comparison of the two, I think I have been enabled to make out more satisfactorily than has been hitherto done, the true structure of *Nemertes* and its congeners.

To begin with the large common cavity of the body, in both species it would appear to be common to the respiratory, digestive, and at the same time to the generative systems. The water in which the animal lives is transmitted through this cavity, and thus acts as a means of respiration. In *Serpentaria* it acts I would say almost altogether as an organ of digestion, and for this purpose its construction is slightly different from that of *Nemertes*, in which animal the structure approaches more to that of the true *Planaria*, in so far as it is endowed with an extensile trumpet-shaped proboscis, which is continuous with a large puckered-up tube running along the upper and central part of the common cavity, and which, contrary to the supposition of Rathke and other naturalists, is, according to the opinion already expressed by Ehrenberg, the intestinal canal. It is tied down at intervals by a strong fibrous or muscular band—mesentery, which, when unwound, allows the intestine to escape from its attachments. The ovaries which run down on each side of the body have no means of throwing off the ova except into the common cavity. It appears to me therefore that Ehrenberg is correct in supposing that cavity to be an egg-passage, and in *Serpentaria* this is more fully shown than in *Nemertes*. In the former the ova are apparently developed throughout the whole length of the ovaries, so that they have no way of escaping except by means of the common cavity; in the latter the ova are only being fully developed at the posterior extremity of the ovaries.

Quatrefages and others suppose that the slender filaments which run along each side of the body belong to the nervous system, but from all the observations I have made, there cannot be a doubt that they are the testicles of the animal; besides, we are bound by analogy to infer that none of the animals belonging to this order are so highly organized as to have a nervous system,

at least so complicated. However this may be, the microscopic structure of these filaments sufficiently proves that they are not nervous, and at the same time points out their true characters as already mentioned. With regard to the bundle of nervous fibres seen by Rathke proceeding from the cerebral ganglion to the narrow furrows on each side of the rostrum, that can easily be accounted for from the furrows in question being the orifices of the seminal tubes, so that consequently the tubes must be continuous with them. I could not perceive the slightest vestige of filaments proceeding from the so-called ganglion to the anterior part of the body, and in the specimens which came under my own observation neither eyes nor ocellated points could be seen.

FORBESIA. Pl. XX. fig. 4.

The animal to which I have given the above name, and which is now to be briefly described, is peculiar and very interesting on account of its gigantic size; gigantic, inasmuch as all the heretofore known similar forms have been microscopic. When the first specimen was brought to me, and from the cursory observation which I then made, it appeared to belong to *Vorticella*. Having been made acquainted by Professor Edward Forbes, the godfather of the present species, with Sars's paper on *Pedicellina*, I was thus also enabled to compare it with that eminent naturalist's description of those animals*. After a very cursory examination, however, it was found to differ very widely from both of the above forms.

It is about six inches in length, the pedicel being five and the body one inch long; the body is about half an inch, and the pedicel about $\frac{1}{8}$ th of an inch in diameter. The oral extremity of the body is concave, with an oblong transverse aperture in the centre. The lips which surround this aperture are thick and fleshy, deeply serrated, and armed on their internal edges with a double row of fleshy cirrhi. Numerous spines of a clavate form and horny structure are thinly scattered over the lower part of the peduncle. A considerable number of fleshy papillæ also arise from a small portion of the body, forming a zone. The papillæ from one portion of this zone are more numerous and more regularly arranged than in the other part.

Until this animal has been more carefully examined, I am not prepared to specify any characters, either generic or specific. The opinion expressed by Professor Edward Forbes, that the polype here described is only one torn from a polypidom common to many, appears to be correct; but until we are satisfied of this from

* I am indebted to Mr. Halket of Edinburgh for the translation of this paper.

actual observation, it would be useless to characterize it. With the view of assisting in the proper illustration of the animal, I herewith append M. Sars's description of *Pedicellina*.

The external appearance as well as the peculiar course of the intestinal canal seem to bring this species near to the *Vorticella*; but it is distinguished from these by its distinctly developed tentacles, which give it a greater resemblance to the Polypi. In fact, it seems to be the link which connects the Infusoria just named with the Polypi.

The *Pedicellina* exhibits itself in the form of several stalked polypi of a sort of gelatinous substance, shooting straight up from a round creeping (?) root. The stem terminates at the top in an oblong, somewhat compressed knob, on the upper end of which, in a hollow, the mouth is found. The hollowed upper surface of this knob forms a sort of edge (or rim) round it, which does not always preserve the same form, inasmuch as it sometimes distends itself to a size greatly exceeding the ordinary thickness of the knob, and sometimes contracts itself very considerably. From this cause proceeds the variety of form which the knob assumes, being sometimes egg-shaped and sometimes cup-shaped. But it is the stem which chiefly exhibits the movements of life. When irritated it moves easily and actively in all directions. Round the upper end or edge of the knob is a single row of cylindrical tentacles, the inner side of which is furnished with numerous fine and short filaments (cirrhi), which are in almost constant motion, somewhat like the swimming-filaments of the *Ribbemanaterne* (*Acalepha Ctenophora*, Eschs.), by which motion a current is produced in the water, and a crowd of the Infusoria which serve it for food are drawn into its mouth or are caught by the tentacles. These last are sometimes thrust out, sometimes drawn in or laid back; they can also be moved in a variety of ways.

One of the most singular phenomena about the *Pedicellina* is the course of the intestinal canal. It is observed in the interior of the knob proceeding from the mouth downwards along one of the small sides, then expanding at the bottom of the knob into an oval-shaped stomach, and thence turning upwards along the opposite small side and running back towards the region of the mouth. The mouth and the anus are thus close to each other in the before-mentioned hollow. This formation is interesting and totally different from the Polypi, with the exception of the *Flustra* and the Corallines which are related to them; unless indeed we agree with Rapp in excluding these from the Polyps.

We find in the *Pedicellina* a striking analogy with *Vorticella*, according to Ehrenberg's representation of their digestive organs; but I have never observed a plurality of stomachs. As regards

the propagation of the *Pedicellina*, it is accomplished by shoots which come straight from the root, which seems also to be the case with the *Zoanthi*: I have never observed amongst them any other mode of propagation.

1st spec. *Pedicellina echinata*.—The long cylindrical stem is everywhere equally thick, and provided all round with numerous thin, pointed prickles. In some of them a few similar prickles are observed on the knob. The knob itself is oval and compressed. One of the small sides where the gut ascends is more convex than the opposite one. The upper edge is furnished with a circle of 24 tentacles, which number however varies in individuals from 20—22—24. These tentacles are about half the length of the knob. Within are seen a longitudinal row of numerous transparent globules. The ascending gut I have often seen filled with dark brown excrement which had gathered itself into oval particles. In the food-canal are sometimes seen a large number of little grains in constant motion, which doubtless were infusoria which they had swallowed. When the tentacles or any other part of the animal is touched, it shrinks from the irritating object, turning the stem to a side, bringing the tentacles together, or drawing them in and shutting its mouth. These contractions however are performed slowly, while on the other hand the stem moves quickly with the slightest touch. The whole length of the animal is about $\frac{1}{6}$ " , the knob $\frac{1}{16}$ " long and $\frac{1}{8}$ " broad. The colour is whitish and transparent. This sort is found attached to various bodies, as *Cochylia*, *Serpula*, *Sertularia*, in the Fiord of Bergen.

2nd spec. *Pedicellina gracilis*.—The stem of this kind is quite smooth and free from prickles; it is also thinner and proportionably longer than the preceding one. The whole animal however is smaller, about 1" long, and the stem of the thickness of the finest hair. The knob is less oblong than the preceding one, and on the end is furnished with about 20 tentacles. The stem below is a little thinner than above, but expands at the lowest end into a short thick cylinder. The stem as a whole is of a more firm consistence, except the knob and the lower thick part which are softer. It appears therefore to bend only at these two places. When irritated, therefore, either the upper part of the stem with the knob moves, which gives the animal a nodding appearance, or the whole stem bends, at the base, to the side or downwards. This sort, like the former, were found on a conglomerate of *Serpula*, a large number together. It doubtless also has similar creeping roots; but I was not fortunate enough to find any of them torn up; nor could they be distinctly seen, in consequence of the minute dimensions of the animal. Sometimes however a small

continuation of the stem could be seen, probably a part of the root.

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EXPLANATION OF PLATE XX.

Fig. 1. *Serpentaria fragilis* reduced to one-half its natural size.

Fig. 2. Abdominal surface of the anterior part of the body, showing the cloaca.

Fig. 3. *Nemertes gracilis*, reduced to one-half nat. size.

Fig. 4. *Forbesia formosa*, natural size.

Fig. 5. *Pedicellina echinata*, nat. size, and magnified after Sars.

LIV.—*A Century of new Genera and Species of Orchidaceous Plants.* Characterized by Professor LINDLEY.

[Continued from p. 257.]

Decades 5 and 6.

41. *LYCASTE barbifrons*; foliis oblongis in petiolum longum angustatis plicatis, bractea suprema angusta ovario paulo longiore, sepalis petalisque subconformibus lanceolatis falcatis lateralibus in mentum longum productis, labello oblongo basi concavo 5-lineato appendice lata emarginata adnata; lamina oblonga plana basi fimbriata apice rotundata laciniis lateralibus rotundatis, columna antice villosissima auriculis apice falcatis.

Peru (Hartweg).

Very near *L. lanipes*, but twice as large, and with long-stalked leaves. It is also different in the form of the lip and in the shaggy column.

42. *MAXILLARIA lepidota*; acaulis, foliis solitariis ligulatis acutissimis in petiolum angustatis, pedunculis unifloris acute vaginatis erectis dimidium folii æquantibus, sepalis elongatis linearibus acuminatis, petalis setaceo-acuminatis duplo brevioribus, labello carnosio obovato trilobo apice carinato et utrinque lepidoto lacinia intermedia ovata lateraliumque margine anteriore crenatis, tuberculo angusto vix medium labelli attingente.

Popayan (Hartweg).

43. *MAXILLARIA procurrens*; caulescens, pseudobulbis obovatis compressis diphyllis, foliis ligulatis subsessilibus, pedunculis solitariis squamoso-imbricatis pseudobulbis longioribus, sepalis petalisque ovatis acutis, labello oblongo obtuso indiviso juxta basin callo oblongo aucto.

Popayan (Hartweg):

Very like *M. platypetala*.

44. *ONCIDIUM pentadactylon*; pseudobulbis ovatis compressis diphyllis, foliis lanceolatis tenuibus scapo longissimo paniculato multo bre-